

1 (Whereupon, the deposition began at ^
2 ^ a.m. ^ p.m.) 8:51

3 VIDEOGRAPHER: We are back on the record
4 for Volume 2 deposition of Dr. Brian Murphy. Today
5 is March 26th, 2009. The time is 8:51 a.m. counsel 08:51AM
6 please identify yourselves.

7 MR. PAGE: David Page for the State of
8 Oklahoma and with me here is Dr. Olsen.

9 MS. COLLINS: Melissa Collins for the
10 Cargill defendants. 08:51AM

11 MR. GRAVES: James Graves for the George's
12 Farms.

13 WITNESS
14 having first been duly sworn to testify the truth,
15 the whole truth and nothing but the truth, testified
16 as follows:

17 DIRECT EXAMINATION

18 BY ^

19 Q Good morning, Mr. Murphy.

20 A If morning. 08:51AM

21 Q I want to just remind you you are still under
22 oath today.

23 A Yes.

24 Q I want to follow up with a little bit how we
25 ended yesterday. We were looking at the samples 08:51AM

Draft Copy

1 Q Okay, and does it also indicate that the
2 difference between runoff of beef-amended fields
3 versus poultry-amended fields?

4 A It does for the level of amendment that was
5 used in these simulations.

09:36AM

6 Q Let's look at another study. Let me hand you
7 Murphy Exhibit 22 and you might want to take a
8 minute like your counsel wisely advised you to take
9 a moment to take a look at this document before we
10 begin discussing it.

09:36AM

11 A All right.

12 Q Okay, sir. Could you read for the Record the
13 title of this article?

14 A Decreasing metal runoff from poultry litter
15 with aluminum sulfate.

09:39AM

16 Q Okay. Have you ever reviewed Murphy Exhibit
17 22?

18 A I have not.

19 Q Okay. Would you read for the Record -- oh,
20 can you tell me where this article was published?

09:39AM

21 A It was published in the Journal of
22 Environmental Quality.

23 Q And what were the investigators?

24 A P oh Moore, junior, DC Daniel, JT Gilmore,
25 with and BH wood.

09:39AM

Draft Copy

1 Q And where were those gentleman located at the
2 time they published this report?

3 A University of Arkansas, University of Kentucky
4 and Auburn University.

5 Q Do you know whether or not the states of 09:40AM
6 Kentucky and Alabama have substantial poultry
7 operations?

8 A I do not.

9 Q Do you know how Arkansas ranks among other
10 states as far as the concentration of poultry 09:40AM
11 operations?

12 A I have not investigated that.

13 Q All right. Sir. Would you read the first two
14 sentences in the abstract?

15 A Aluminum sulfate applications to poultry 09:40AM
16 litter can greatly reduce phosphorus concentration
17 in runoff from fields fertilized with poultry litter
18 as well as decrease NH3 volatilization. The objective
19 of this study was to evaluate metal runoff from
20 plots fertilized with varying rates of alum 09:40AM
21 /TRAO*ETD and untreated bracket normal bracket
22 poultry litter.

23 Q All right, sir. Now, let's turn to the next
24 page, please, and go to the section on Page 93 of
25 this exhibit and see where it says materials and 09:41AM

Draft Copy

1 methods?

2 **A** Yes.

3 **Q** Just for background for the court, could you
4 just read the first three or four sense /T*S, about
5 halfway down in that column under /TEFLS and
6 methods?

09:41AM

7 **A** This study was conducted using 52 small plots,
8 is.52 but 3.05 meters with 5 percent slope located
9 at the main agricultural experiment station of the
10 University of Arkansas on a Captina silt loam soil,
11 fine silt I mess sick type -- I'm tip /PEUBL
12 FRAGIUDULT, all in brackets, which had been in
13 continuous fess few for two years.

09:41AM

14 **Q** Continue, sir. The plots have runoff process
15 cross at the down slope that enable the collection
16 of runoff water. There were a total of 13
17 treatments, four rates of alum treated /P-FL, four
18 rates of untreated poultry litter, four rates of
19 ammonium nitrogen tray and one of unfertilized
20 control?

09:42AM

09:42AM

21 **Q** Now, sir, I want to now go to the next page
22 and see where it says results and discussion and
23 then trace metal runoff?

24 **A** Yes.

25 **Q** On Page 94. Would you read about half the way

09:42AM

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1 down that column under copper runoff?

2 **A** Soluble copper concentrations in the runoff
3 water of the unfertilized control plots average .01
4 milligrams of copper per liter for the first runoff
5 events and .014 milligrams copper per liter for the
6 second event seven days later.

09:42AM

7 **Q** Is that referring then to Figure 1?

8 **A** Yes, it does.

9 **Q** Okay. Would you continue on?

10 **A** These values are near the average .015
11 milligrams copper per liter of that for natural
12 waters in the USA.

09:43AM

13 **Q** So is that your control, unfertilized or
14 unamended fields results?

15 **A** I believe that's correct, yes.

09:43AM

16 **Q** Would you continue, sir?

17 **A** The amount of soluble copper in the runoff
18 water increases linearly with litter application
19 rate regardless of litter type but was significantly
20 higher than litter than alum treated litter. Figure
21 1, tables 2 and 3.

09:43AM

22 **Q** One more sentence, sir?

23 **A** At the highest litter application rate, the
24 average soluble litter concentrations from all you
25 mean was 93 times higher than the control,

09:43AM

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1 bracket.93 milligrams copper per liter.

2 Q Okay. Well, you can continue but I think
3 that's as far as we immediate to go.

4 A All right.

5 Q Does that indicate -- that finding indicate to 09:44AM
6 you that there's a difference in copper runoff from
7 a native soil field versus a poultry litter amended
8 soil field?

9 A For the soils that were used in this
10 experiment, yes. 09:44AM

11 Q Okay. Let's look at figure No. 1. Does that
12 table indicate that dissolved copper runoff from
13 poultry-amended fields is substantially different
14 than unamended fields?

15 A Figure 1 /#-S a comparison between alum 09:44AM
16 streeted fields and fertilized but non-alum treated
17 fields.

18 Q If you look at the top part of Figure 1, can
19 you tell me where the -- what dot is the control
20 field before application for runoff? 09:45AM

21 A Well, the litter application rate is at 00 of
22 the coordinate system.

23 Q So -- so -- so the no applications would
24 represent the point at zero zero?

25 A As near as can be told on this figure. 09:45AM

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1 Q And if we just focus on the unamended unalum
2 amended portion of the evaluation, which would be
3 the top line; correct?

4 A Correct.

5 Q Does it show that an unamended field has a 09:46AM
6 substantially different copper, dissolved copper
7 runoff than be a poultry-amended field?

8 A For the conditions of experiment, yes.

9 Q Does it also indicate, sir, that with
10 increasing litter applications on the field, the 09:46AM
11 copper runoff concentration also increases?

12 A Yes, it does for the untreated litter as well
13 as for the alum treated litter.

14 Q

15 MR. PAGE: Let's take our morning break 09:46AM
16 here.

17 VIDEOGRAPHER: We now off the Record at
18 9:47 a.m..

19 (Following a short recess at ^
20 ^ a.m. ^ p.m., proceedings continued on the Record
21 at ^ ^ a.m. ^ p.m.)

22 VIDEOGRAPHER: We're back on the record.
23 The time is 0:08 a.m.

24 Q Dr. Murphy, let's continue on with this paper
25 by Mr. Moore as lead author, Exhibit 22 to your 10:08AM

Draft Copy

1 deposition. Let's now -- we looked at copper.

2 Let's look at zinc. I believe the discussion begins

3 on Page 95. Would you read beginning under zinc

4 runoff to the sentence that ends on the next pages.

5 Read through that, please?

10:08AM

6 **A** Soluble zinc consist /TAEUGSS in the runoff

7 from control plot were 0047 for had perfect

8 milligrams if for the first and second runoff E

9 /SREBT, Figure 4A and B. These values are slightly

10 below the average.064 milligrams zinc per liter of

10:09AM

11 that for natural waters in the USA, man /HAPB 1991.

12 **Q** Could you ask you to stop and ask a quick

13 question there, sir. Is it clear that the

14 investigator are comparing natural waters with

15 runoff from unaffected fields to see -- to make a

10:09AM

16 comparison of those two types of waters?

17 **A** It's an average of some sort for the USA for

18 natural waters.

19 **Q** Okay. You don't know whether those are

20 stream?

10:09AM

21 **A** I have not looked at the man /HAPB paper.

22 **Q** Thank you, sir. Would you continue?

23 **A** As with copper the /SAO*EPBGS concentrations

24 of the runoff water increased with litter

25 application rate for both types of litter on the

10:10AM

Draft Copy

1 first runoff event, Table 2.

2 Q Okay. Now, let's look at Table 2 -- excuse
3 me, Figure 4. Does Figure 4 right below where we
4 stopped provide a chart similar to the copper chart
5 showing a comparison between untreated fields and
6 then poultry-treated fields for zinc runoff?

10:10AM

7 A For soluble zinc countries /TRAEUGSs, yes.

8 Q Okay, sir, and if we look at the upper part of
9 Figure 4, focus on that, what does it show the
10 control runoff amount to be approximately?

10:10AM

11 A It looks like it's about .04 milligrams zinc
12 per liter.

13 Q Okay, and does the runoff from this field
14 increase as poultry litter applications are
15 increased?

10:11AM

16 A The soluble zinc concentration increases as
17 poultry litter application is increased.

18 Q Thank you, sir, and so does this indicate,
19 this experiment that native soils would have less
20 zinc runoff than poultry-amended fields?

10:11AM

21 A If the conditions are the same as in this
22 simulation, yes.

23 Q Okay. These authors, along with the other
24 authors, a lot of them are from Arkansas, University
25 of Arkansas; correct?

10:11AM

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1 **A** Several are, yes.

2 **Q** Would you expect these you a horse to try to
3 simulate local soil and runoff conditions in their
4 experiments?

5 MS. COLLINS: Object to form. 10:11AM

6 **A** I haven't addressed it.

7 **Q** Okay. Let's go to arsenic, sir. Let's just
8 turn to the Figure 5, which is soluble arsenic, and
9 again, looking at that figure on Page 97, does it
10 indicate that arsenic, soluble arsenic 10:12AM
11 concentrations are increased at poultry-applied
12 fields as opposed to control or native fields?

13 MS. COLLINS: Object to form.

14 **A** In this experiment, that's what this shows.

15 **Q** Does it show that the arsenic runoff from 10:12AM
16 poultry-amended fields increases based on the number
17 of applications?

18 **A** It does immediately. As with the zinc that we
19 just looked at, seven days later the amount applied
20 is much less important. In fact, you even see some 10:12AM
21 decreases.

22 **Q** So that would be after -- is that for arsenic
23 on Figure 5 or were you looking at aluminum, sir?

24 **A** My comment goes to both Figure 4 and Figure 5,
25 the lower portion of each figure, seven days later 10:13AM

Draft Copy

1 you don't see that same increase with the amount
2 applied, particularly in Figure 4.

3 Q You don't -- you talking about -- let's go
4 back to Figure 4. You don't see as much of an
5 increase over time in Figure 4?

10:13AM

6 A In Figure 4 it doesn't look like there's any
7 increase with application after seven days.

8 Q After the first rainfall event for the second
9 rainfall event; correct?

10 A For the second simulated rainfall, yes.

10:13AM

11 Q Okay, and for arsenic. For the first rainfall
12 event, there's an increase based on litter
13 application rates; correct?

14 A For the first simulated rainfall, yes.

15 Q And what about for the second?

10:13AM

16 A For the second, there's overall a slight
17 increase.

18 Q So most of the arsenic appears to be running
19 off after the first runoff event; is that correct?

20 A That is correct.

10:14AM

21 Q Okay. Let's -- I don't believe they plotted
22 iron but let's go on to look at iron. Could you
23 read the first sentence under iron on Page 97 of the
24 exhibit?

25 A Soluble iron increased linearly with litter

10:14AM

Draft Copy

1 application rate for both the am /HRUPL treated and
2 untreated litter.

3 Q So does that indicate to you, sir, that iron
4 also increased -- iron runoff was increased in
5 litter applied fields as opposed to control fields?

10:14AM

6 A That's what it indicates.

7 Q Okay. Would you look at the Figure 6 for
8 aluminum? Does it appear that for aluminum the
9 control fields have less runoff than the litter
10 applied fields?

10:15AM

11 A For the first rainfall event, yes. For the
12 second rainfall event, the uncertainty or error is
13 such that you could draw a horizontal line
14 through it rather than one that's increasing with
15 application check that.

10:15AM

16 Q So for aluminum there's not as much evidence
17 of increased runoff from applied fields; is that
18 correct, sir?

19 A I'd say that's correct, yes.

20 Q But over -- if you get up to about ten
21 applications, does it appear that there's a
22 difference between the control fields and -- and the
23 litter-applied fields?

10:15AM

24 A Well, it's not ten applications. It's the
25 amount applied, which I think is -- looks like it's

10:15AM

Draft Copy

1 megagrams perfect heart attack tear.

2 Q Yes, sir.

3 A Yeah.

4 Q Thank you for that correction but does it
5 based on the amount of applied, that there would be
6 an increase over control fields?

10:16AM

7 A For the first rainfall event, yes, for the
8 first simulated rainfall event.

9 Q Let's turn now to the next page, Figure 7 for
10 /KALS /KWRUPL. Does it appear that the control
11 fields have much less calcium runoff than
12 litter-applied fields?

10:16AM

13 A For the untreated litter, but for the alum
14 treated litter, there's no difference.

15 Q Right.

10:16AM

16 A For the first rainfuel and for neither is
17 there any difference after the second rainfall.

18 Q We're talking untreated litter. Do you know
19 whether or not the IRW litter is treated?

20 A I do not.

10:16AM

21 Q Okay. Let' /TKPWO*S with untreated litter.
22 Is there a difference in calcium runoff for
23 untreated litter?

24 A For untreated litter after the first rainfall,
25 there is an increase with the amount applied.

10:16AM

Draft Copy

1 Q Let's go to the next page, sir. Do you see
2 where it says on Page 99, pot for the and sodium
3 runoff?

4 A Yes.

5 Q Would you read the first two sentences there? 10:17AM

6 A Concentrations of potassium and sodium in
7 runoff water followed similar trends, Table 2 and 3.
8 The concentrations of both these meltses increased
9 linearly with increased application rate for the
10 first runoff event and tended to be higher with 10:17AM
11 plots treated with am /HRUPL treated litter, data
12 not shown.

13 Q What does it indicate the potassium
14 concentrations were?

15 A Potassium concentrations were in excess of 200 10:17AM
16 and 250 milligrams potassium per liter in runoff
17 from the highest rate of untreated and alum treated
18 litter during the first event.

19 Q So do the authors conclude -- did the authors
20 demonstrate here in this experiment that there's a 10:17AM
21 difference in most constituents that they measured
22 between the runoff in an untreated field versus a
23 poultry-treated field?

24 A For the metals that we've looked at, that is
25 correct. 10:18AM

Draft Copy

1 Q Would you read the first two sentences under
2 the conclusions?

3 A Trace metal, arsenic, copper, iron and zinc
4 concentrations in the runoff waters from the plots
5 fertilized with poultry litter were increased as 10:18AM
6 litter applications increased and were higher for
7 untreated litter compared to alum treated litter.

8 Q Do you agree that that conclusion is
9 representative of the data you've reviewed?

10 A I do. 10:18AM

11 Q Would you continue on, sir?

12 A The metal of greatest concern in poultry
13 litter is copper, which was found in extremely high
14 concentrations in the runoff of untreated litter,
15 one milligram of copper per liter. 10:18AM

16 Q Okay. Thank you, sir. So does this paper and
17 the experiments performed by the investigators
18 indicate that there's a difference between native
19 soil runoff and poultry litter-applied soil runoff?

20 A For some compounds, but it doesn't indicate 10:19AM
21 that by conclusion regarding Dr. Olsen's PC analysis
22 is incorrect.

23 Q I'm confident you would say that sir. I move
24 to strike the last portion of the statement as not
25 responsive. 10:19AM

Draft Copy

1 Does it also -- does the investigation also
2 indicate that with poultry application increases,
3 runoff for these constituents, these metals, also
4 increase?

5 **A** In these simulations, yes. 10:19AM

6 **Q** In these two papers, how many of the
7 parameters in Olsen's PCA analysis were
8 investigated?

9 **A** Well, I haven't been keeping count but we've
10 looked at something like six or eight. 10:20AM

11 **Q** Would you agree with me if I said fourteen of
12 the 26 parameters in the PCA were investigated in
13 these two papers?

14 **A** I'd need to go back and count.

15 **Q** Okay. Do you have a recollection as to 10:20AM
16 whether or not the constituents that are
17 investigated in these two papers also tended to be
18 the highly loaded constituents in Olsen's PCA he
19 value ways?

20 MS. COLLINS: Object to form. 10:20AM

21 **A** By highly loaded, do you mean highly leaded on
22 PC1?

23 **Q** Yes, sir. I don't think that tells you the
24 whole story because you need to answer PC 679679
25 object. 10:20AM

Draft Copy

1 Q Would you answer the question?

2 A I don't recall.

3 Q Well, the -- there have been runoff samples
4 collected in this case; correct, sir?

5 A They are the edge of field samples. 10:21AM

6 Q Okay, and I'd like to take a moment to look at
7 some of the results of the edge of field samples.
8 Let me hand you what's marked as Exhibit 23. Can
9 you identify that for the Record, please, sir?

10 A It's the summary -- it's titled summary of 10:21AM
11 edge of field poultry samples. I don't know who it
12 was prepared by.

13 Q I'll represent to you this is Appendix C of
14 Olsen's report in this case. You received a copy of
15 Dr. Olsen's report, did you not? 10:22AM

16 A Yes.

17 Q Okay. Did you review this data?

18 A Well, I reviewed it in the con/TEFBGTS of the
19 principal component analysis.

20 Q You didn't actually look at this Appendix C 10:22AM
21 that I'm /SHO*G you right now?

22 A I don't recall doing so.

23 Q What's the name of this document, sir?

24 A Table 1, summary of edge of field poultry
25 samples. 10:22AM

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